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In re Patent Application of:

Byung-hoon OH et al.

Application No.: 10/679,293 Group Art Unit: 2115

Filed: October 7, 2003 Examiner: Dennis BUTLER

For: APPARATUS AND METHOD FOR CONTROLLING POWER OF MONITOR

SUBMISSION OF VERIFIED ENGLISH TRANSLATIONS OF CERTIFIED COPIES OF PRIOR FOREIGN APPLICATIONS IN ACCORDANCE WITH THE REQUIREMENTS OF 37 C.F.R. § 1.55

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 1.55, the applicants submits herewith a Verified English Translation of certified copies of the following foreign applications:

Korean Patent Application No. 2002-67059, Filed: October 31, 2002

Korean Patent Application No. 2002-68086, Filed: November 5, 2002

It is respectfully requested that the applicants be given the benefit of the foreign filing dates as evidenced by the certified papers attached hereto, in accordance with the requirements of 35 U.S.C. § 119.

Respectfully submitted,

STAAS & HALSEY LLP

Date: March 27, 2009 By: Paul F. Daebeler

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CERTIFICATION OF TRANSLATION

I, ***Soohyun Shin***, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2002-0067059*** consisting of ***11*** pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 24th day of March 2009

Soohyun Shin

ABSTRACT

[Abstract of the Disclosure]

Provided are an apparatus for and method of controlling the power of a personal computer (PC) system, and more particularly, an apparatus for and method of controlling the power of a monitor through recognizing power of a PC, the monitor being automatically powered on and off according to the state of power of the PC, without the need to separately power the monitor on and off. The apparatus includes a computer which outputs a predetermined signal when the computer is powered on or off and a monitor which receives the predetermined signal and is powered on and off according to the state of the predetermined signal. Since the monitor can be powered on and off by switching the power of the PC on and off, a PC system can be more conveniently used without the need to separately and manually power the monitor on and off. Further, even when a user forgets to turn the power of the monitor off while turning the power of the PC off, unnecessary power consumption can be avoided since the power of the monitor automatically switches off. Furthermore, the power switch of the monitor can be eliminated since the monitor can be powered on and off by switching the power of the PC on and off.

[Representative Drawing]

FIG. 2

SPECIFICATION

[Title of the Invention]

Apparatus for and Method of Controlling Power of Monitor through Recognizing Power of Personal Computer

[Brief Description of the Drawings]

FIG. 1 shows a typical configuration of a PC system;

FIG. 2 is a block diagram of an apparatus for controlling power of a monitor through recognizing power of a personal computer (PC), according to a preferred embodiment of the present invention; and

FIG. 3 is a flowchart of a method of controlling power of a monitor through recognizing power of a PC, according to a preferred embodiment of the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to an apparatus for and method of controlling the power of a personal computer (PC) system, and more particularly, to an apparatus for and method of controlling the power of a monitor through recognizing power of a PC, the monitor being automatically powered on and off according to the state of power of the PC, without the need to separately power the monitor on and off.

FIG. 1 shows a typical configuration of a PC system. As shown in FIG. 1, a PC system is typically comprised of a PC 100, a monitor 101, and a serial cable for data communications between the PC 100 and the monitor 101.

In order to operate the PC system, a power switch 100-1 for the PC 100 and a power switch 101-1 for the monitor 101 are switched on, respectively. When the PC 100 is powered on, a video card (not shown) within the PC 100 operates to output video signals. The output video signals are transmitted to the monitor 101 through the serial

cable. After using the PC system, the power switches 100-1 and 101-1 are switched off to turn the PC 100 and the monitor 101 off, respectively.

As described above, it is inconvenient for a user to use the typical PC system since the PC 100 and the monitor 101 must be respectively powered on to operate the PC system and respectively powered off after using the PC system. Further, in a case where the user forgets to power off the monitor 101 while powering off the PC 100, a problem occurs in that a significant amount of power is consumed by the monitor 101 which is continuously powered on.

[Technical Goal of the Invention]

The present invention provides an apparatus for controlling the power of a monitor through recognizing power of a PC, where the monitor can be automatically powered on and off according to the state of power of the PC without the need to separately powering the monitor on and off.

Further, the present invention provides a method of controlling the power of a monitor through recognizing power of a PC, where the monitor can be automatically powered on and off according to the state of power of the PC without the need to separately powering the monitor on and off.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided an apparatus for controlling the power of a monitor through recognizing power of a PC, the apparatus including: a computer which outputs a predetermined signal according to the state of power of the computer; and a monitor which receives the predetermined signal and is powered on and off according to the state of the predetermined signal.

The predetermined signal output from the computer may be a signal output from a predetermined pin of a video card that processes and transmits video signals to the monitor and the transmittance of the predetermined signal to the monitor may be allowed even when the monitor is powered off so that monitor information can be read.

The monitor may include: a memory which stores the monitor information; a control means which compares a reference level with the level of the predetermined signal transmitted to the memory when the monitor is powered off so that the computer can read the monitor information, detects the state of power of the computer based on

the result of the comparison, and outputs a monitor power control signal; and a power supply means which supplies or cuts off power to the monitor in accordance with the monitor power control signal output from the control means.

If the level of the predetermined signal is higher than the reference level, the control means may output a control signal to supply power to the monitor, and if the level of the predetermined signal is lower than the reference level, the control means may output a control signal to cut off power to the monitor.

According to another aspect of the present invention, there is provided a method of controlling the power of a monitor through recognizing power of a PC, the method including: (a) receiving a predetermined signal from a computer according to the state of power of the computer; and (b) powering a monitor on and off according to the state of the predetermined signal.

The predetermined signal output from the computer may be a signal output from a predetermined pin of a video card that processes and transmits video signals to the monitor and the transmittance of the predetermined signal to the monitor may be allowed even when the monitor is powered off so that monitor information can be read.

(b) may include: (b-1) detecting the level of the received predetermined signal; (b-2) supplying power to the monitor if the level of the predetermined signal is higher than the reference level; and (b-3) cutting off power to the monitor if the level of the predetermined signal is lower than the reference level.

Preferred embodiments of the present invention will now be described with reference to the attached drawings.

FIG. 2 is a block diagram of an apparatus for controlling power of a monitor through recognizing power of a PC, according to a preferred embodiment of the present invention. The apparatus is comprised of a PC 200 including a power switch 200-1 and a video card 200-2 outputting video signals, and a monitor 201 including a memory 201-1, a control unit 201-2, and a power supply 201-3. In addition, a serial cable is used for data communication between the PC 200 and the monitor 201.

The apparatus according to the preferred embodiment of the present invention will be described in detail with reference to FIG. 2.

The PC 200 in which Windows 95 or Windows 98 is embedded has a PnP (Plug and Play) function. PnP connotes an instant start. When a hardware device is connected to an I/O (input/output) port of the PC, the hardware device can be instantly

used without a separate configuration or installation operations. Since the monitor 201 is a kind of peripheral device connected to an I/O port of the PC 200, the monitor 201 can be immediately used without any separate configurations to be made due to the PnP function.

A predetermined pin of the video card 200-2 included in the PC 200 is used to connect the monitor 201 to an I/O port of the PC 200. When the PC 200 is powered on, a predetermined signal is output from the predetermined pin, e.g., the 9th pin, of the video card 200-2 and transmitted to the monitor 201 via the serial cable. Here, the predetermined signal output from the 9th pin of the video card 200-2 can be transmitted to the monitor 201 even when the monitor 201 is in a power off state. The memory 201-1 of the monitor 201 stores monitor information concerning, e.g., a manufacturer of the monitor, the resolution of the monitor, etc. The predetermined signal output from the 9th pin of the video card 200-2 drives the memory 201-1 so that the monitor information stored in the memory 201-1 can be read. As described above, due to the PnP function, the PC 200 can read the monitor information even when the monitor 201 is in a power off state.

The predetermined signal output from the 9th pin of the video card 200-2 is used to power the monitor 201 on or off by detecting the power of the PC 200. The predetermined signal output from the 9th pin of the video card 200-2 is transmitted to the monitor 201 when the PC is powered on. At the same time, video signals are output from the other pins of the video card 200-2 to display the monitor information via the monitor 201. If the PC 200 is powered on, the level of the predetermined signal output from the 9th pin of the video card 200-2 is 5V, and if the PC 200 is powered off, the level of the predetermined signal is 0V since no signal is output from the video card 200-2.

The control unit 201-2 senses the level of the predetermined signal output from the 9th pin of the video card 200-2 and controls the power supply 201-3 to stop supplying power to the monitor 201. If the level of the predetermined signal output from the 9th pin of the video card 200-2 is 5V, the control unit 201-2 determines that the PC 200 is powered on and controls the power supply 201-3 to supply power. Then, the power is supplied from the power supply 201-3 to each block of the monitor 201. However, if the level of the predetermined signal output from the 9th pin of the video card 200-2 is 0V, the control unit 201-2 determines that the PC 200 is powered off and

controls the power supply 201-3 to stop supplying power. Then, the power supply 201-3 stops supplying power to each block of the monitor 201.

FIG. 3 is a flowchart of a method of controlling power of a monitor through recognizing power of a PC, according to a preferred embodiment of the present invention. The method includes switching on the power of a PC to drive the PC (operation 300), transmitting signals output from a video card of the PC to a monitor through a serial cable (operation 301), the monitor detecting the level of a signal output from the 9^{th} pin of the video card among the signals output from the video card (operation 302), determining whether the level of the signal output from the 9^{th} pin of the video card is 5V or 0V (operation 303), if the level of the signal output from the 9^{th} pin of the video card is 5V, the monitor determining that the PC is powered on and switching on the power of the monitor (operation 304), and if the level of the signal output from the 9^{th} pin of the video card is 0V, the monitor determining that the PC is powered off and switching off the power of the monitor (operation 305).

The method according to the preferred embodiment of the present invention will be described in more detail with reference to FIGS. 3.

In this embodiment, it is assumed that the monitor 201 is initially powered off.

In order to drive the PC 200, a user powers on the PC 200 by switching on the power switch 200-1 (operation 300).

When the PC 200 is powered on by switching on the power switch 200-1, the video card 200-2 processes video signals and transmits them to the monitor 201 through the serial cable (operation 301). Since the monitor 201 is powered off at this moment, the monitor 201 does not operate even when the video signals output from the video card 200-2 are transmitted to the monitor 201. However, the power of the monitor 201 can be turned on or off with a predetermined signal output from the 9^{th} pin of the video card 200-2. The memory 201-1 of the monitor 201 stores monitor information concerning, e.g., the manufacturer of the monitor, resolution of the monitor, etc. The predetermined signal output from the 9^{th} pin of the video card 200-2 drives the memory 201-1 of the monitor that is currently powered off so that the memory information stored in the memory 201-1 can be read. Accordingly, it is possible to detect the power state of the PC 200 using the level of the predetermined signal output from the 9^{th} pin of the video card 200-2 and thus to control the power of the monitor 201 according to the power state of the PC 200.

The control unit 201-2 of the monitor 201 detects the level of the predetermined signal output from the 9th pin of the video card 200-2 of the PC 200 (operation 302).

If the level of the predetermined signal output from the 9th pin of the video card 200-2 of the PC 200 is 5V, the control unit 201-2 of the monitor 201 determines that the PC 200 is powered on and drives the power supply 201-3 (operations 303 and 304). When the power supply 201-3 is driven, the monitor 201 is powered on.

However, if the level of the predetermined signal output from the 9th pin of the video card 200-2 of the PC 200 is not 5V is 0V, the control unit 201-2 of the monitor 201 determines that the PC 200 is powered off and stops driving the power supply 201-3 (operation 305). When the power supply 201-3 stops operating, the monitor 201 is powered off.

While the present invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the appended claims.

[Effect of the Invention]

As described above, according to the present invention, since a monitor can be powered on and off by switching only the power of a PC on and off, a PC system can be more conveniently used without needing to separately and manually power the monitor on and off. Further, even when a user forgets to turn the power of the monitor off while turning the power of the PC off, unnecessary power consumption can be avoided since the power of the monitor automatically switches off. Furthermore, the power switch of the monitor can be eliminated since the monitor can be powered on and off by switching only the power of the PC on and off.

What is claimed is:

1. An apparatus for controlling the power of a monitor, comprising:

a computer which outputs a predetermined signal according to the state of power of the computer; and

a monitor which receives the predetermined signal and is powered on and off according to the state of the predetermined signal.

2. The apparatus of claim 1, wherein the predetermined signal output from the computer is a signal output from a predetermined pin of a video card that processes and transmits video signals to the monitor and the transmittance of the predetermined signal to the monitor is allowed even when the monitor is powered off so that monitor information can be read.

3. The apparatus of claim 1, wherein the monitor comprises:

a memory which stores the monitor information;

a control means which compares a reference level with the level of the predetermined signal transmitted to the memory when the monitor is powered off so that the computer can read the monitor information, detects the state of power of the computer based on the result of the comparison, and outputs a monitor power control signal; and

a power supply means which supplies or cuts off power to the monitor in accordance with the monitor power control signal output from the control means.

4. The apparatus of claim 3, wherein if the level of the predetermined signal is higher than the reference level, the control means outputs a control signal to supply power to the monitor, and if the level of the predetermined signal is lower than the reference level, the control means outputs a control signal to cut off power to the monitor.

5. A method of controlling the power of a monitor, comprising:

(a) receiving a predetermined signal from a computer according to the state of power of the computer; and

(b) powering a monitor on and off according to the state of the predetermined signal.

6. The method of claim 5, wherein the predetermined signal output from the computer is a signal output from a predetermined pin of a video card that processes and transmits video signals to the monitor and the transmittance of the predetermined signal to the monitor is allowed even when the monitor is powered off so that monitor information can be read.

7. The method of claim 5, wherein (b) comprises:

(b-1) detecting the level of the received predetermined signal;

(b-2) supplying power to the monitor if the level of the predetermined signal is higher than the reference level; and

(b-3) cutting off power to the monitor if the level of the predetermined signal is lower than the reference level.

FIG. 1

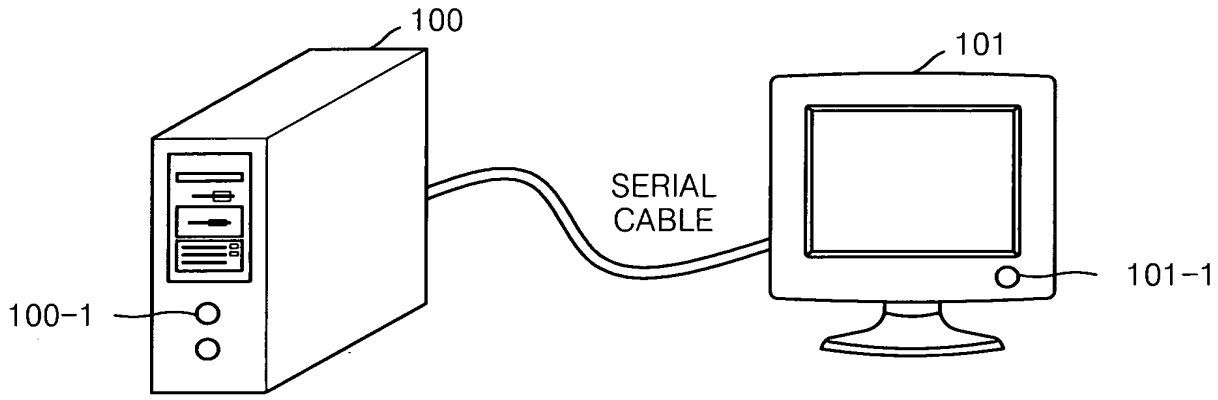

100
101
SERIAL
CABLE
100-1
101-1

FIG. 2

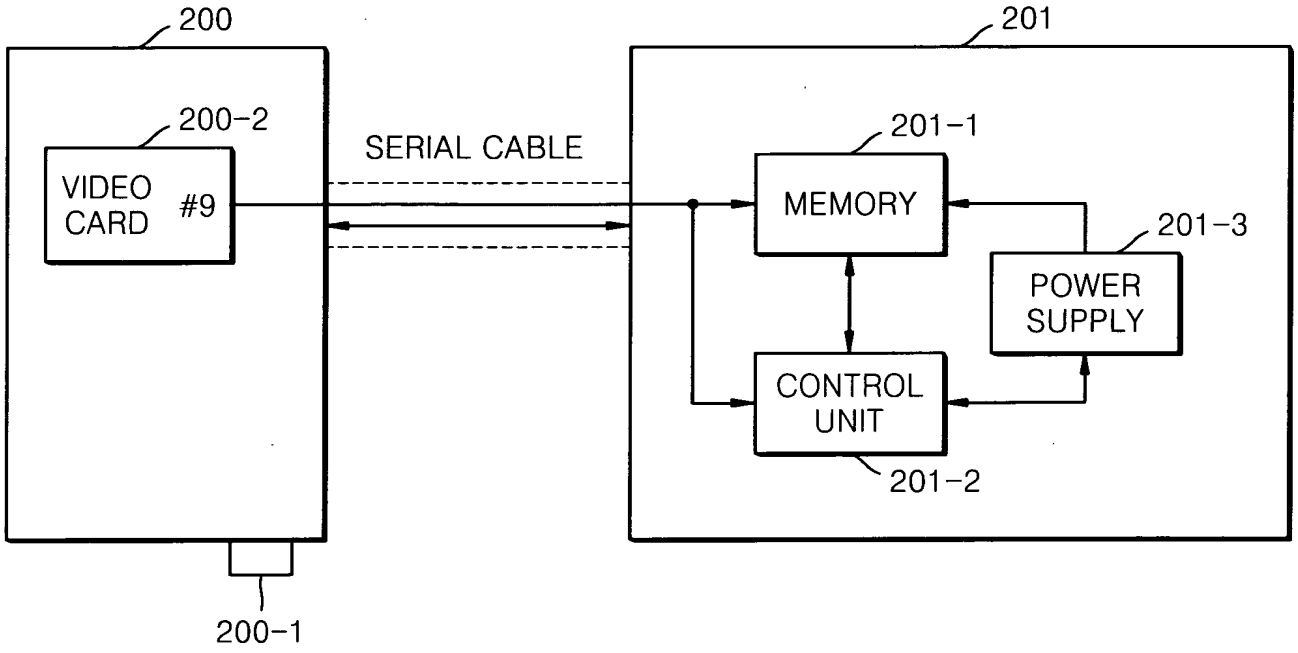
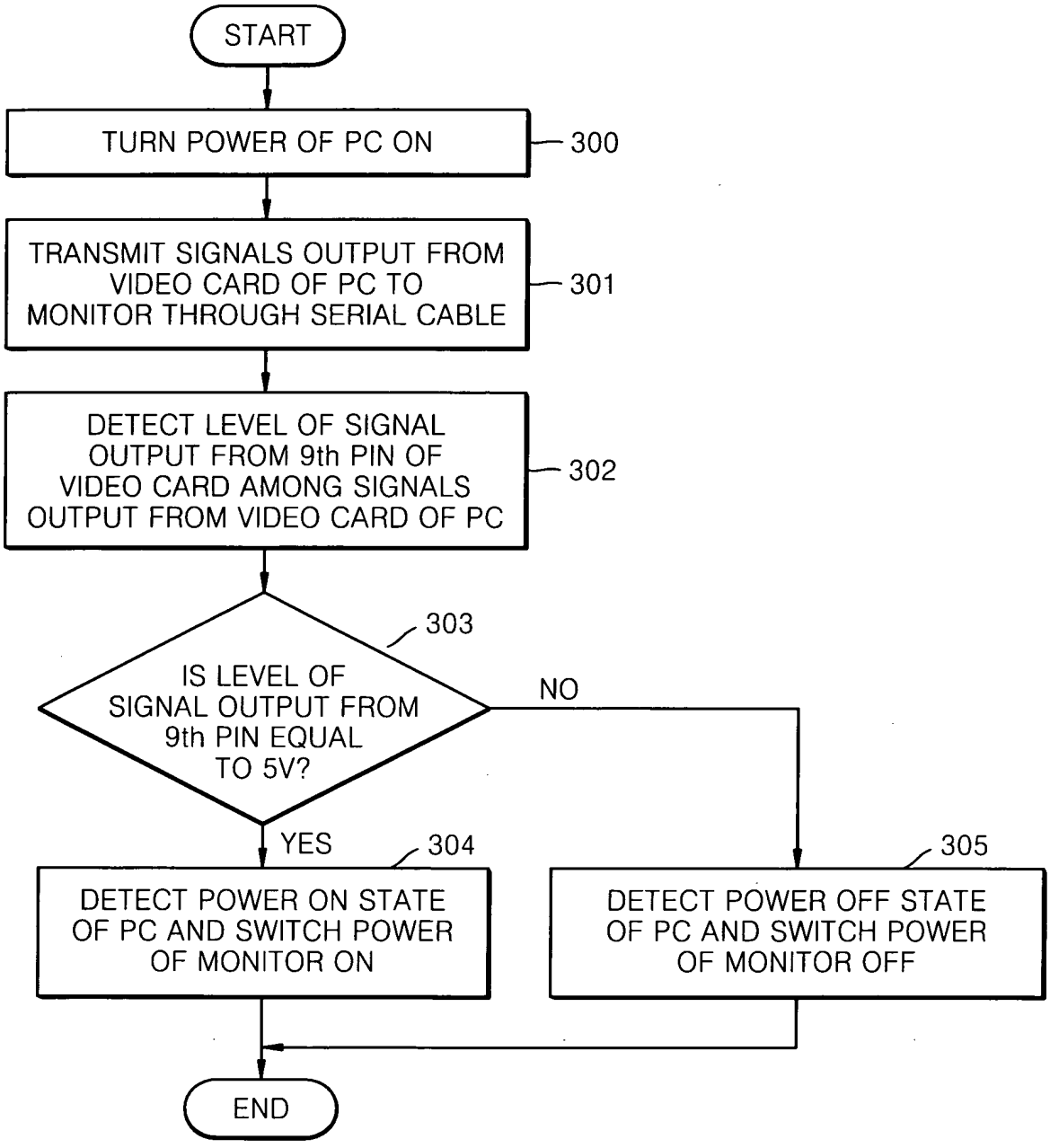

200
201
200-2
VIDEO
CARD
#9
SERIAL CABLE
201-1
MEMORY
201-3
POWER
SUPPLY
CONTROL
UNIT
201-2
200-1

FIG. 3


START
TURN POWER OF PC ON
300
TRANSMIT SIGNALS OUTPUT FROM VIDEO CARD OF PC TO MONITOR THROUGH SERIAL CABLE
301
DETECT LEVEL OF SIGNAL OUTPUT FROM 9th PIN OF VIDEO CARD AMONG SIGNALS OUTPUT FROM VIDEO CARD OF PC
302
303
IS LEVEL OF SIGNAL OUTPUT FROM 9th PIN EQUAL TO 5V?
NO
YES
304
DETECT POWER ON STATE OF PC AND SWITCH POWER OF MONITOR ON
305
DETECT POWER OFF STATE OF PC AND SWITCH POWER OF MONITOR OFF
END

CERTIFICATION OF TRANSLATION

I, ***Soohyun Shin***, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2002-0068086*** consisting of ***12*** pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 24th day of March 2009

Soohyun Shin

ABSTRACT

[Abstract of the Disclosure]

Provided are an apparatus for and method of controlling the power of a personal computer (PC) system, and more particularly, an apparatus for and method of controlling power of a monitor where the monitor is powered on and off upon receiving a predetermined signal output according to the state of power of a PC. The apparatus includes: a computer that outputs a predetermined signal in addition to data signals, according to a state of power of the computer; and a monitor that receives the predetermined signal and the data signals and is powered on and off according to the state of the predetermined signal. Accordingly, a monitor is powered on and off upon receiving a predetermined signal output according to a state of power of a PC, and thus power consumption of the monitor is minimized. Further, the monitor is not required to be separately powered on and off, and thus convenience of a user is increased.

[Representative Drawing]

FIG. 2

SPECIFICATION

[Title of the Invention]

Apparatus for and Method of Controlling Power of Monitor

[Brief Description of the Drawings]

FIG. 1 is a block diagram of a conventional apparatus for controlling power of a monitor;

FIG. 2 is a block diagram of an apparatus for controlling power of a monitor according to a preferred embodiment of the present invention; and

FIG. 3 is a flowchart of a method of controlling power of a monitor according to a preferred embodiment of the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to an apparatus for and method of controlling the power of a personal computer (PC) system, and more particularly, to an apparatus for and method of controlling power of a monitor where the monitor is powered on and off upon receiving a predetermined signal output according to the state of power of a PC.

FIG. 1 is a block diagram of a conventional apparatus for controlling power of a monitor. The apparatus includes a PC 100, a monitor 101, and a serial cable for allowing data communication between the PC 100 and the monitor 101. The monitor 101 includes a power supply 101-1 for supplying power to other blocks within the monitor 101, a control unit 101-2 for sensing signals from the serial cable and generating a power switching control signal to control the power supplied to the other blocks within the monitor 101, and first, second, and third switches 101-3, 101-4, and 101-5 for switching the power supplied from the power supply 101-1 among the other blocks within the monitor 101 under the control of the control unit 101-2.

Signals output from the PC 100, i.e., VGA signals, are transmitted to the monitor 101 through the serial cable. The control unit 101-2 receives the signals output from the PC 100 and outputs a power switching control signal to control the power supplied

to the other blocks within the monitor 101 according to the state of power of the PC 100. However, in order to monitor the state of the PC 100, a certain amount of power should be continuously supplied to the control unit 101-2. That is, even in a DPMS (Display Power Management System) mode, i.e., a power saving mode of the PC 100, a certain amount of power for driving at least the control unit 101-2 should be supplied to the monitor 101. Accordingly, unless the plug of the monitor 101 is pulled out, the monitor 101 is continuously powered on, and thus, power is continuously consumed.

[Technical Goal of the Invention]

The present invention provides an apparatus for controlling power of a monitor where the monitor is powered on and off upon receiving a predetermined signal output according to the state of power of a PC.

Further, the present invention provides a method of controlling power of a monitor where the monitor is powered on and off upon receiving a predetermined signal output according to the state of power of a PC.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided an apparatus for controlling the power of a monitor, including: a computer that outputs a predetermined signal in addition to data signals, according to a state of power of the computer; and a monitor that receives the predetermined signal and the data signals and is powered on and off according to the state of the predetermined signal.

The predetermined signal may be a signal output from a predetermined pin that is not used in a transmission line for data communication between the computer and the monitor and may control the powering on and off of the monitor.

The monitor may be powered off when the predetermined signal is not received from the computer since the computer is in a DPMS (Display Power Management System) mode or in a power off mode.

The monitor may be powered on when the monitor receives the predetermined signal transmitted from the computer after the monitor has been powered off.

According to another aspect of the present invention, there is provided a method of operating a monitor that displays signals transmitted from a computer, including: (a) the monitor receiving a predetermined signal transmitted from the computer according

to a state of power of the computer; and (b) powering the monitor on and off according to the state of the predetermined signal.

The predetermined signal may be a signal output from a predetermined pin that is not used in a transmission line for data communication between the computer and the monitor and may control the powering on and off of the monitor.

The monitor may be powered off when the predetermined signal is not received from the computer in (b) due to the computer being in a DPMS (Display Power Management System) mode or in a power off mode in (a).

The monitor may be powered on when the monitor receives the predetermined signal transmitted from the computer after the monitor has been powered off.

Preferred embodiments of the present invention will now be described with reference to the attached drawings.

FIG. 2 is a block diagram of an apparatus for controlling power of a monitor according to a preferred embodiment of the present invention. The apparatus is comprised of a PC 200 and a monitor 201. In this embodiment, the monitor 201 includes a power supply 201-1, a control unit 201-2, and first, second, and third switches 201-3, 201-4, and 201-5.

FIG. 3 is a flowchart of a method of controlling power of a monitor according to a preferred embodiment of the present invention. The method includes: turning power of a PC on (operation 300); transmitting VGA signals to be displayed and power signals to drive a control unit of a monitor from the PC to the monitor (operation 301); the monitor displaying the VGA signals (operation 302); the PC determining whether the PC is in a DPMS mode (operation 303); determining whether the PC is in a power off mode (operation 304); turning the power of the PC off (operation 305); determining whether the PC is released from the DPMS mode or powered on again (operation 306); and turning on the power of the monitor and displaying the VGA signals (operation 307).

The present invention ill now be described in detail with reference to FIGS. 2 and 3.

First, the apparatus will be described with reference to FIG. 2. When a user powers on the PC 200 and the monitor 201 to use a PC system, the PC 200 transmits VGA signals to the monitor 201 through a serial cable to display the VGA signals via the monitor 201.

In this embodiment, the serial cable is for transmitting the VGA signals produced by the PC 200 to the monitor 201. Conventionally, only the VGA signals have been transmitted from the PC 200 to the monitor 201 through the serial cable. However, in this embodiment, not only the VGA signals but also a power signal to drive the control unit 201-2 of the monitor 201 is transmitted through the serial cable. The power signal to drive the control unit 201-2 of the monitor 201 corresponds to a predetermined signal in claims. The serial cable includes a number of pins for transmitting the VGA signals and additional pins that are not used in transmitting the VGA signals. The power signal to drive or stop driving the control unit 201-2 of the monitor 201 is transmitted to the control unit 201-2 through any one of the unused additional pins of the serial cable.

When the power of the PC 200 is in a normal mode, the VGA signals and the power signal to drive the control unit 201-2 of the monitor 201 are transmitted to the monitor 201 through the serial cable. The control unit 201-2 receives the VGA signals and controls the monitor 201 to display the VGA signals. The control unit 201-2 keeps operating insofar as the power signal is received. Under the control of the control unit 201-2, the power supply 201-1 supplies power to each block of the monitor 201. In response to the received power signal, the control unit 201-2 outputs a power switching control signal to control the supply of power to each block. The first, second, and third switches 201-3, 201-4, and 201-5 respond to the power switching control signal so that the power can be supplied from the power supply 201-1 to each block.

When the power of the PC 200 is in an abnormal mode, i.e., a DPMS mode or a power off mode, the VGA signals and the power signal to drive the control unit 201-2 of the monitor 201 are not transmitted from the PC 200 to the monitor 201 through the serial cable. Basically, in the DPMS mode, the control unit 201-2 must output the power switching control signal to the first through third switches 201-3, 201-4, and 201-5 to stop the supply of power from the power supply 201-1. However, since the PC 200 does not transmit the VGA signals and the power signal to drive the control unit 201-2, the power supplied to the control unit 201-2 is cut off. Accordingly, the monitor 201 consumes minimal power, i.e., the power consumed by an adapter (not shown). When the PC is in the power off mode, the power supplied to the control unit 201-2 is cut off since the PC 200 does not transmit the VGA signals and the power signal to drive the control unit 201-2. Accordingly, the monitor 201 consumes minimal power, i.e., the power consumed by an adapter (not shown).

Thereafter, when the power of the PC 200 returns to the normal mode, the VGA signals and the power signal to drive the control unit 201-2 of the monitor 201 are again transmitted to the monitor and, accordingly, the monitor 201 is normally driven.

Now, the method will be described with reference to FIG. 3. In order to drive the PC system, a user powers on the PC 200 and the monitor 201 (operation 300).

When the PC 200 and the monitor 201 are powered on, the PC 200 transmits the VGA signals to be displayed to the monitor 201 and the power signal to drive the control unit 201-2 of the monitor 201 (operation 301).

When the power signal to drive the control unit 201-2 is received, the monitor 201 detects that the power of the PC 200 is in a normal mode and displays the VGA signals (operation 302).

The control unit 201-2 determines whether the PC 200 is in a DPMS mode. If the PC is in the DPMS mode, the monitor 201 is powered off (operations 303 and 305). Basically, in the DPMS mode, the control unit 201-2 must output the power switching control signal to the first through third switches 201-3, 201-4, and 201-5 to stop the supply of power from the power supply 201-1. However, since the PC 200 does not transmit the VGA signals and the power signal to drive the control unit 201-2, the power supplied to the control unit 201-2 is cut off. Accordingly, the monitor 201 consumes minimal power, i.e., the power consumed by an adapter (not shown).

If the PC is not in the DPMS mode, the control unit 201-2 determines whether the PC 200 is in a power off mode. If the PC is in the power off mode, the monitor 201 is powered off (operations 304 and 305). When the PC is in the power off mode, the power supplied to the control unit 201-2 is cut off since the PC 200 does not transmit the VGA signals and the power signal to drive the control unit 201-2. Accordingly, the monitor 201 consumes minimal power, i.e., the power consumed by an adapter (not shown).

Thereafter, it is determined whether the PC 200 is released from the DPMS mode or powered on again. If the PC 200 is released from the DPMS mode or powered on again, the monitor 201 is again powered on and displays the VGA signals (operations 306 and 307). When the power of the PC 200 returns to the normal mode, the VGA signals and the power signal to drive the control unit 201-2 of the monitor 201 are again transmitted to the monitor, and accordingly, the monitor 201 is normally driven.

While the present invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the appended claims.

[Effect of the Invention]

As described above, according to the present invention, a monitor is powered on and off upon receiving a predetermined signal output according to a state of power of a PC, and thus power consumption of the monitor is minimized. Further, the monitor is not required to be separately powered on and off, and thus convenience of a user is increased.

What is claimed is:

1. An apparatus for controlling the power of a monitor, comprising:

a computer that outputs a predetermined signal in addition to data signals, according to a state of power of the computer; and

a monitor that receives the predetermined signal and the data signals and is powered on and off according to the state of the predetermined signal.

2. The apparatus of claim 1, wherein the predetermined signal is a signal output from a predetermined pin that is not used in a transmission line for data communication between the computer and the monitor and controls the powering on and off of the monitor.

3. The apparatus of claim 1, wherein the monitor is powered off when the predetermined signal is not received from the computer since the computer is in a DPMS (Display Power Management System) mode or in a power off mode.

4. The apparatus of claim 1, wherein the monitor is powered on when the monitor receives the predetermined signal transmitted from the computer after the monitor has been powered off.

5. A method of operating a monitor that displays signals transmitted from a computer, comprising:

(a) the monitor receiving a predetermined signal transmitted from the computer according to a state of power of the computer; and

(b) powering the monitor on and off according to the state of the predetermined signal.

6. The method of claim 5, wherein the predetermined signal is a signal output from a predetermined pin that is not used in a transmission line for data communication between the computer and the monitor and controls the powering on and off of the monitor.

7. The method of claim 5, wherein the monitor is powered off when the predetermined signal is not received from the computer in (b) due to the computer being in a DPMS (Display Power Management System) mode or in a power off mode in (a).

8. The method of claim 5, wherein the monitor is powered on when the monitor receives the predetermined signal transmitted from the computer after the monitor has been powered off.

FIG. 1

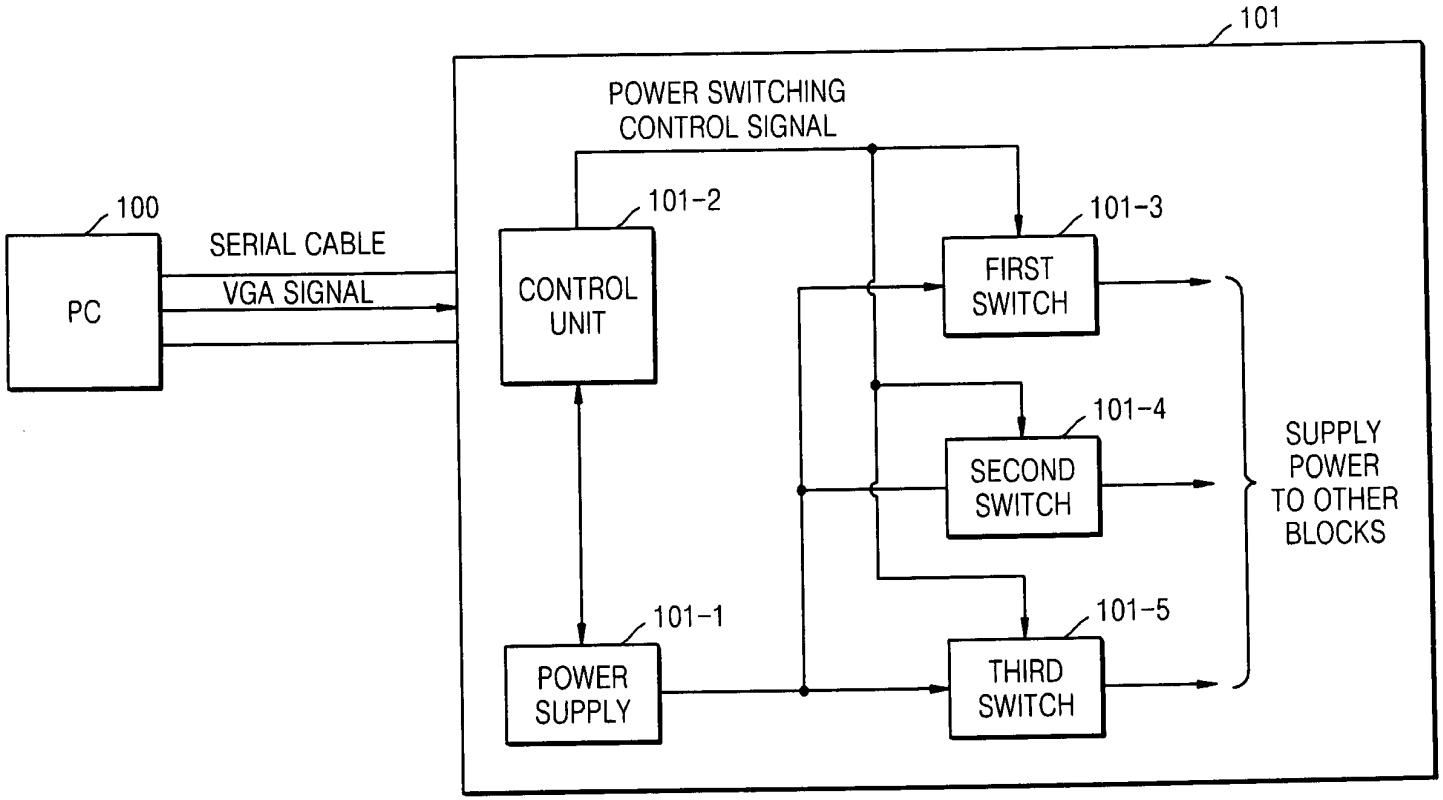

101
POWER SWITCHING
CONTROL SIGNAL
100
PC
SERIAL CABLE
VGA SIGNAL
101-2
CONTROL
UNIT
101-3
FIRST
SWITCH
101-4
SECOND
SWITCH
101-5
THIRD
SWITCH
101-1
POWER
SUPPLY
SUPPLY
POWER
TO OTHER
BLOCKS

FIG. 2

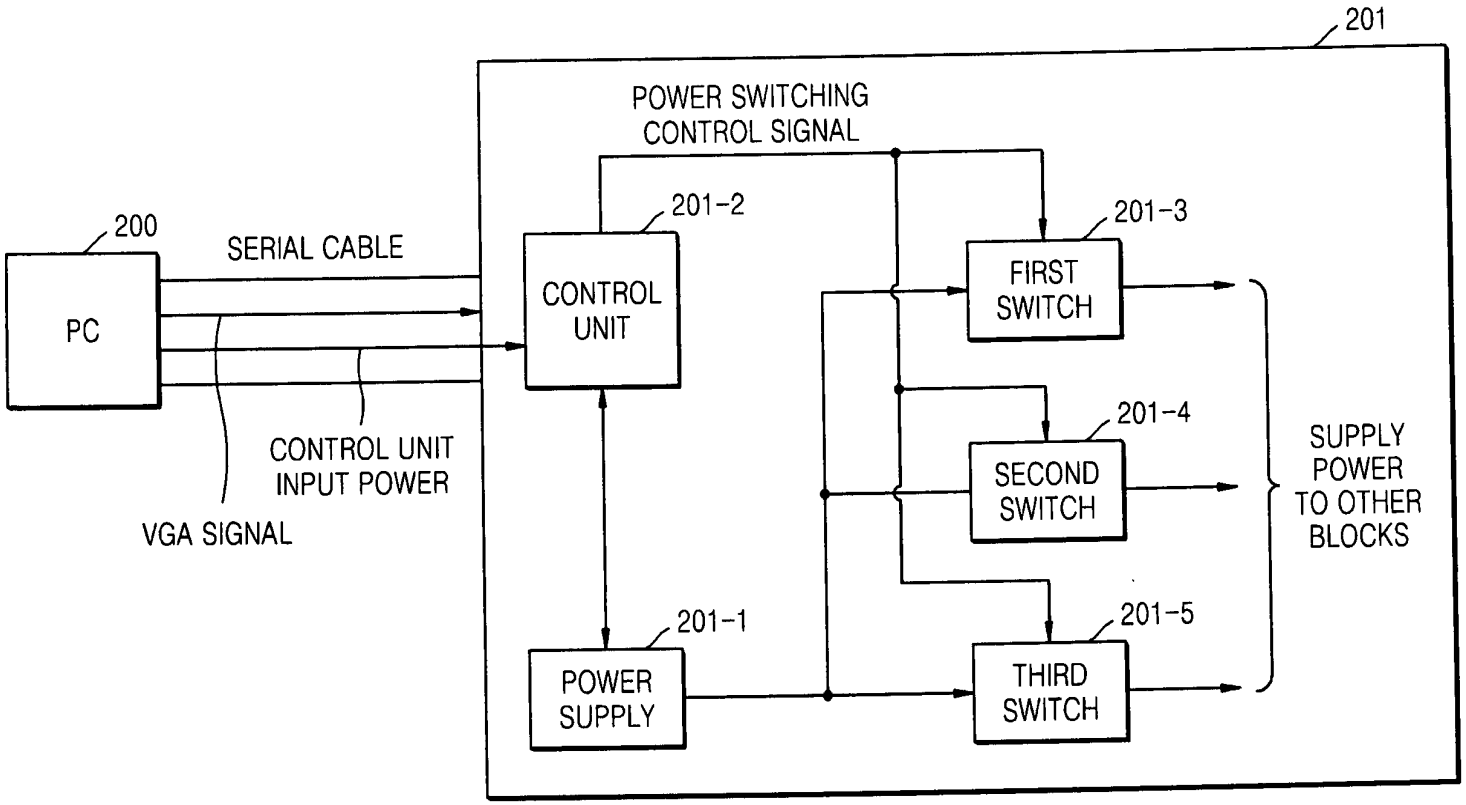
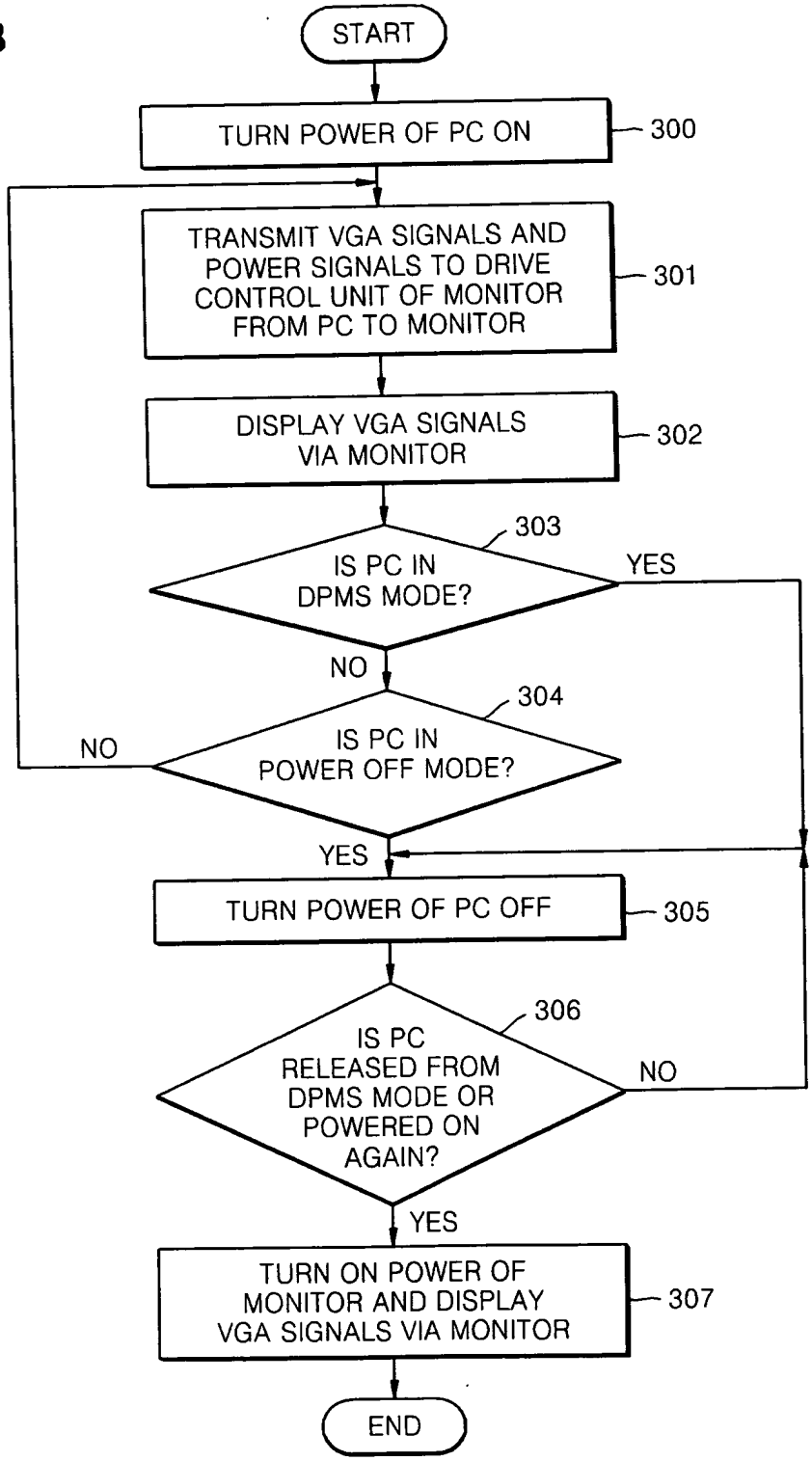

201
POWER SWITCHING
CONTROL SIGNAL
200
PC
SERIAL CABLE
201-2
CONTROL
UNIT
201-3
FIRST
SWITCH
201-4
SECOND
SWITCH
SUPPLY
POWER
TO OTHER
BLOCKS
CONTROL UNIT
INPUT POWER
VGA SIGNAL
201-1
POWER
SUPPLY
201-5
THIRD
SWITCH

FIG. 3


START
TURN POWER OF PC ON
300
TRANSMIT VGA SIGNALS AND POWER SIGNALS TO DRIVE CONTROL UNIT OF MONITOR FROM PC TO MONITOR
301
DISPLAY VGA SIGNALS VIA MONITOR
302
303
IS PC IN DPMS MODE?
YES
NO
304
IS PC IN POWER OFF MODE?
NO
YES
TURN POWER OF PC OFF
305
306
IS PC RELEASED FROM DPMS MODE OR POWERED ON AGAIN?
NO
YES
TURN ON POWER OF MONITOR AND DISPLAY VGA SIGNALS VIA MONITOR
307
END